

Parts For  
Automobile

Turbocharger  
Assy

Parts For Oil  
Hydraulic Pump



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TB0401E-01:4000



# Turbocharger Use Technical Manual



Dear User,

Thank you for choosing the **CHSH**® Turbocharger produced by Chiau-Cheng Company ( hereafter known as Chiau-Cheng ).



**CHSH**® brand Turbocharger has not only passed Chiau-Cheng's strict testing but has also passed testing by and earned high praise from the Industrial Technology Research Institute of Taiwan. In the Ministry of Economic Affairs' plan to encourage business to develop new technology, Chiau-Cheng's " Reciprocating Engine Turbocharger Research and Development " received a research grant and was awarded " Star Luminescent Award " for company excellence.

Chiau-Cheng's **CHSH**® brand turbocharger is currently widely used in automobiles, construction machines, boats, and other equipment.

This manual provides the basic operating information and requirements. In order for the turbocharger to work efficiently, please read through this manual carefully before operating the turbocharger. If you require additional technical support or assistance, please contact your dealer or Chiau-Cheng.

### Specifications

Model	TD02	TD025	TD03	TD04	TD05	TD06	TD07	TD08
Max. Speed rpm	270000	250000	230000	200000	170000	145000	132000	114000
Max. Gas Temperature °C	900	900	900	900	900	900	760	760
Max. Pressure Ratio	2.2	2.2	2.3	2.4	2.6	2.7	2.8	3.1
Weight kg	without W/G*		3.0	3.5	4.0	5.0	9.0	10.5
	with W/G*		3.5	4.0	5.0	6.5	—	—

- W/G\* : Waste Gate Valve System
- Specifications subject to change without prior notice.

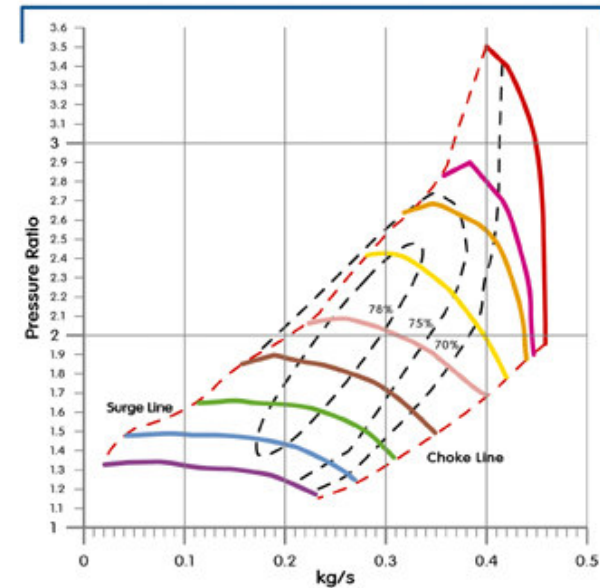
### Characteristic :

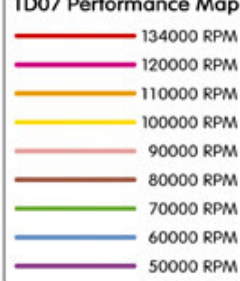
1. Design and analysis of turbomachinery.
2. Gas turbine blisc casting techniques.
3. Test rig design for turbomachinery.
4. Turbomachinery the internal combustion engine.



### Turbocharger Characteristic :

1. The first Local Turbocharger Performance Tester and Digital Platform.
2. The Test Capacity covers all the brands in the world with the Compression Rate 0~5; flow capacity range 0~2 kg/sec.
3. Internet Remote Control System.



Pressure Ratio	3.0	<b>TD07 Performance Map</b> 
Flowrate (kg/sec)	0.45	
RPM	134000	
Efficiency	66%	





**Do not install a new turbocharger before determining and eliminating the cause of a faulty turbocharger.**

If the need to replace the turbocharger arises, please follow the steps stated below :

#### Wash :

1. Empty out all the engine oil.
2. Remove the turbocharger oil inlet pipe and clean out grease deposits and debris inside the pipe as well as the pipe walls. Then, install the pipe onto the engine.
3. Add new lubricant oil ( filter through 20µm filter ) of a brand specified by the engine manufacturer and a filter grade of CD or above.  
 ※ Ensuring that the lubricant oil going into the turbocharger is clean is the key to prolonging the lifespan of the turbocharger.
4. Replace lubricant oil filter as recommended by engine manufacturer. Also, replace air filter.

#### Installation :

5. Add clean lubricant oil into turbocharger oil inlet to pre-lubricate it.
6. Engine lubricating oil pressure can't be less than 3 kg.
7. Replace all the sealing parts connected to the turbocharger when installing the turbocharger.
8. Install the turbocharger in the order recommended by the engine manufacturer.
9. Prevent any foreign object from entering the turbocharger and any pipes connect to it during the turbocharger replacement process.
10. After replacing the turbocharger, please remember to clear the charge air cooler.

#### Use :

11. Start the engine and let it spin at low speed for 3 to 5 minutes.
12. Use as normal.
13. Replace the lubricant oil, its filter and the air filter regularly as specified by the engine manufacturer.

For more information, please refer to Chiau-Cheng's " Turbocharger manual " . Contact dealer directly if there are any questions.



Turbocharger is an important part used to increase the engine efficiency and to reduce black smoke exhaust discharge. The Turbocharger itself is not a power unit source; it works on left over energy from the engine exhaust to provide more compressed air to the engine.

In a boosting cold start engine system, the charge air cooler, placed downstream from the turbocharger compressor, works to lower the temperature of and thereby increase the density of the compressed air.

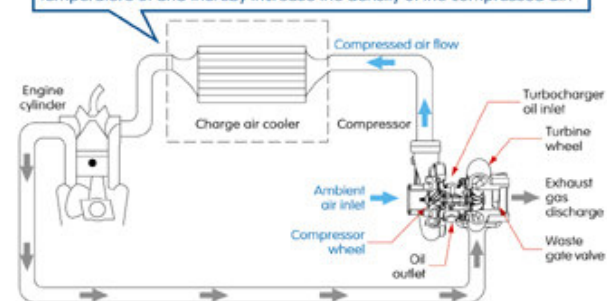
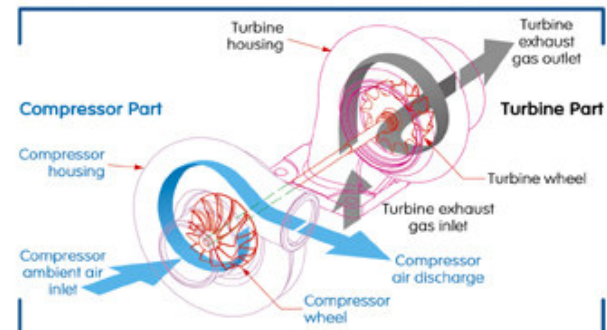


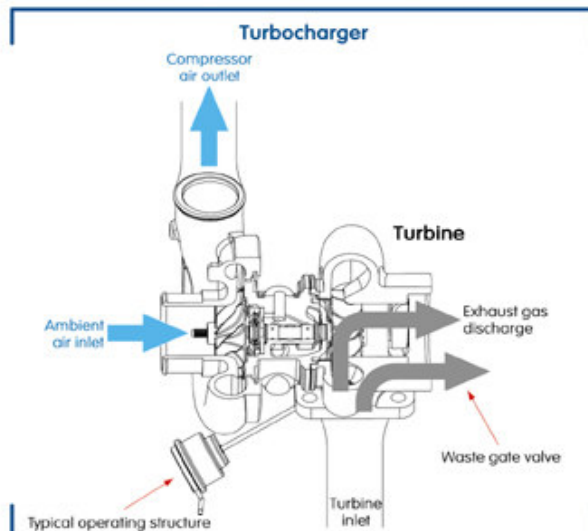
Illustration of Turbocharger Operating Principle

Turbocharger is installed on the exhaust manifold of the engine. The exhaust from the engine cylinder causes the turbine wheel to spin, which then causes the compressor wheel to compress air, filtered through the air filter, to send to the cylinder. The increase of air into the cylinder allows for more fuel injection; fuel burns more efficiently and the engine produces more power along with a reduced amount of black smoke exhaust. The Turbocharger also compensates power when the engine is operating at higher altitudes.





A vent turbocharger with a blow off valve has the benefit of low spin speed and high torque with high and low speed functions. The Vent model operation is controlled by the increase of pressure in the turbocharger. When pressure reaches a specific point, the blow off valve opens and part of the engine exhaust is directly vented to control the pressure ratio so that the explosive pressure in the cylinder does not exceed the allowed engine load value.



Because the turbocharger operates under high-temperature and high-speed, please follow the recommended usage and maintenance methods stated in the manual from the engine manufacturer or turbocharger manufacturer.



Vent Turbocharger



Typical Turbocharger

Proceed with examination only after the engine has cooled;  
**Note :** do not start the engine during examination to avoid injuries to personnel.

If oil leakage occurs, please read the "©" sections again carefully.



- Do not let any foreign object fall into the turbocharger or the engine's air intake or exhaust system during turbocharger installation and removal.



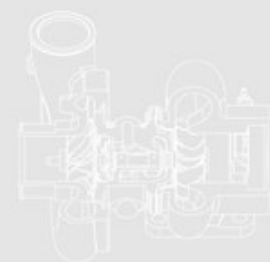


- Please follow the instructions in the installation manual when installing the turbocharger. Also, replace the sealing parts at the turbocharger oil inlet, outlet, and turbine air inlet and outlet to ensure these parts are properly sealed.
- Proper lubrication is critical to the turbocharger function. The Turbocharger is lubricated using the filtered pressure oil from the engine lubrication system connected to the turbocharger oil inlet through an independent oil inlet pipe. Lubricant oil passes through the turbocharger back to the engine oil pan through the return tube by gravity.

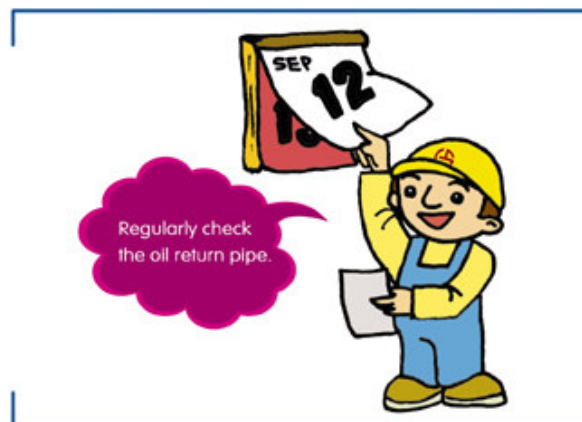


Because the turbocharger spins faster than an engine, it has a higher demand for lubrication. Dirty oil and insufficient lubrication will damage the turbocharger before damaging the engine.

- Only lubricant oil of a brand specified in the engine manual and lubricant filter recommended by the engine manufacturer should be used.
- A Sufficient amount of lubricant oil must be added to the oil inlet opening for newly installed turbochargers or turbochargers that have not been in use for extended periods. Manually turn the wheel until the lubricant oil has been applied to all surfaces of the bearing.



- Regularly check the oil return pipe to ensure it is not blocked.



- The engine crankcase respirator should be kept flowing smoothly to avoid a buildup of pressure in the crankcase affecting the turn flow speed of the lubricant oil which **could lead to a turbocharger oil leak**.



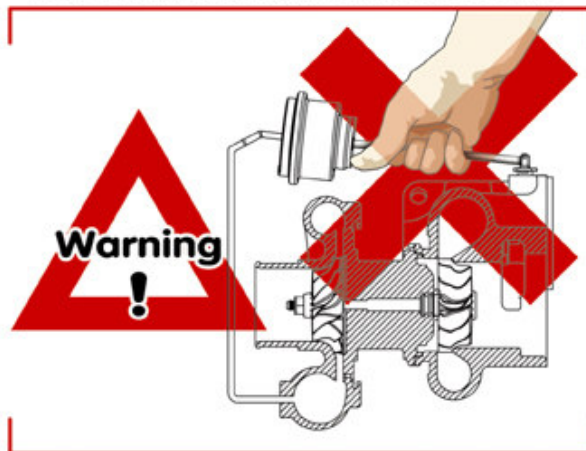
- During installation or use, be sure that the connections between air filter to compressor, and compressor to engine air inlet, turbocharger, and engine exhaust pipe are tightly sealed, otherwise, **it may cause noises and oil leakage**.
- Regularly check or replace the air filter according to the engine manual, otherwise, **problems such as oil leak at the compressor end may arise**.



- After the engine starts, do not drive with an increase load immediately. Start at a low spin speed for about 3 to 5 minutes to ensure proper lubrication and **avoid turbocharger oil leak**.



- Do not turn off the engine immediately after the vehicle comes to a stop. Spin at a low speed for 3 to 5 minutes to allow the temperature and turn speed of the turbocharger to slow down gradually in order to avoid overheating, scorching, and damage to the bearings.

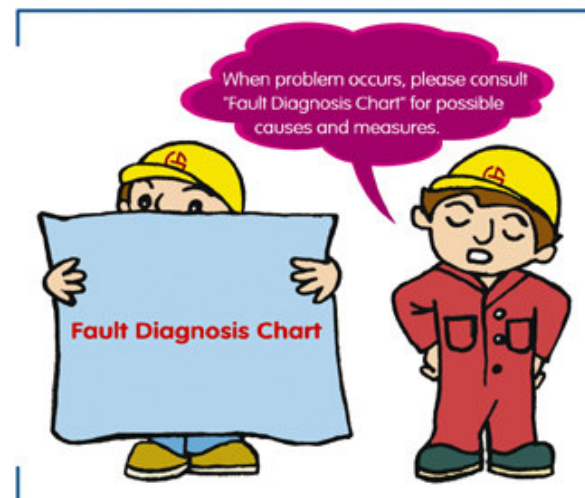


- For turbochargers installed with an exhaust blow off valve, do not treat the pushrod and other parts of the exterior as handlebars, as it may affect the precision of the blow off valve operating structure.

**Note** : Proceed with examination only after the engine has cooled; do not start the engine during examination to avoid injuries to personnel.

If oil leakage occurs, please read the "©" sections again carefully.

During use, when problems occur suspected to be due to turbocharger malfunction, do not remove the turbocharger from the engine or disassemble the turbocharger. Proceed with fault diagnosis first (refer to Fault Diagnosis Chart) for possible causes and corresponding measures. Past experience shows that most turbocharger malfunctions are related to the improper use of the engine. Simply replacing the turbocharger without determining the cause or using the turbocharger replacement to determine the cause will not solve the problem and may lead to new problems with the new turbocharger or other damages.



Chiau-Cheng's experience shows that if the rotor of the turbocharger is functioning and the wheel on both ends are not touching then the turbocharger itself is functioning properly.

After completing and detailing the fault diagnosis, remove the turbocharger, only if it is necessary, for further analysis and examination.

## Fault Diagnosis Chart

Problems							Possible causes	Corresponding measures
Insufficient engine power	Engine exhaust produces black smoke	Over consumption of engine oil	Engine exhaust produces blue smoke	Turboccharger produces excessive noise	Turboccharger produces cyclic noise	Turbine oil seal is leaking oil		
●	●	●	●	●	●	●	Air filter is too dirty.	Replace filter elements as specified by engine manufacturer.
	●	●	●	●	●	●	Compressor air inlet pipe may be blocked.	Remove debris or replace damaged parts accordingly.
●	●			●			Compressor air outlet pipe may be blocked.	Remove debris or replace damaged parts accordingly.
●	●			●			Engine air inlet pipe may be blocked.	Remove debris in accordance with engine manual.
				●			The pipe from air filter to compressor is leaking air.	Replace sealing parts or tighten connection parts accordingly.
●	●	●	●	●			The pipe from compressor to engine air inlet pipe is leaking air.	Replace sealing parts or tighten connection parts accordingly.
●	●	●	●	●			The connection between engine air inlet pipe and cylinder cap is leaking air.	Refer to engine manual and replace washer or tighten connection parts accordingly.
●	●	●	●	●		●	Engine exhaust pipe may be blocked.	Remove debris in accordance with engine manual.
●	●					●	Muffler or the pipe behind it may be blocked.	Remove debris or replace defective parts accordingly.
●	●			●		●	The connection between engine exhaust pipe and cylinder cap is leaking air.	Refer to engine manual and replace washer or tighten connection parts accordingly.
●	●			●		●	The connection between turbine inlet and engine exhaust pipe is leaking air.	Replace washer or tighten connection parts accordingly.
				●			Turbine exhaust pipe is leaking air.	Refer to engine manual to solve air leakage problem.
		●	●			●	Turboccharger return tube may be blocked.	Remove debris or replace oil pipe.
		●	●			●	Engine crankcase respirator may be blocked.	Remove debris in accordance with engine manual.
		●	●			●	Turboccharger middle housing may have dirt deposits or is scorched.	Change oil and oil filter accordingly. Repair or replace turbocharger.
●	●						Fuel injection pump or fuel injection equipment adjustment is incorrect.	Refer to engine manual and replace or adjust relevant parts accordingly.
●	●						Engine timing is inaccurate.	Refer to engine manual and replace worn out parts.
●	●	●	●			●	Engine piston ring or cylinder cap is worn (air escapes).	Refer to engine manual and repair engine as required.
●	●	●	●			●	Problems with engine interior (valve, piston).	Refer to engine manual and repair engine as required.
●	●	●	●	●	●	●	Dirt deposits on compressor wheel and diffuser blade.	Clean with a non-alkaline cleanser and soft brush. Determine why air is not getting filtered and possible solutions. Replace oil and oil filter.
●	●	●	●	●	●	●	Turboccharger is damaged.	Assess turbocharger damage. Determine damage cause and possible solutions. Repair or replace turbocharger as required.